Status of Reaction Plane Detector

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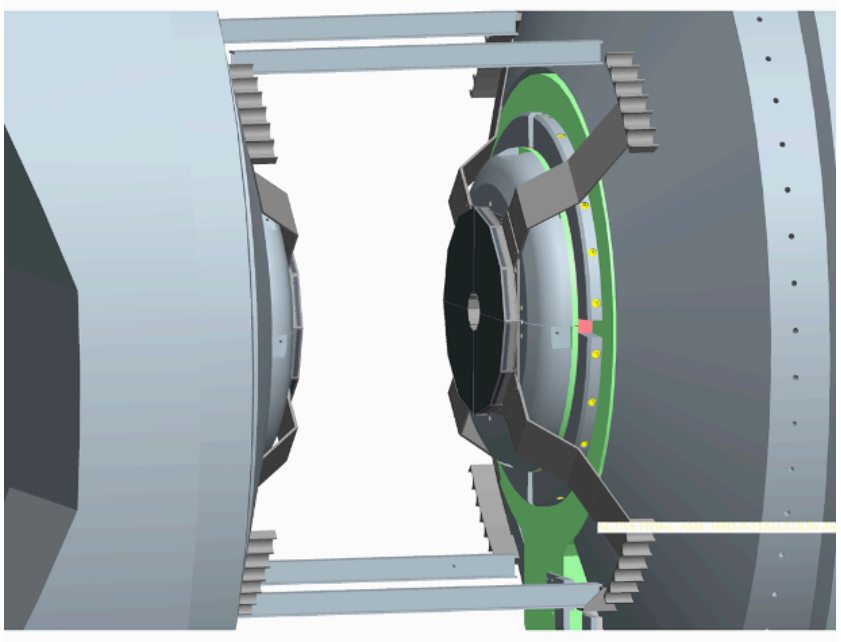
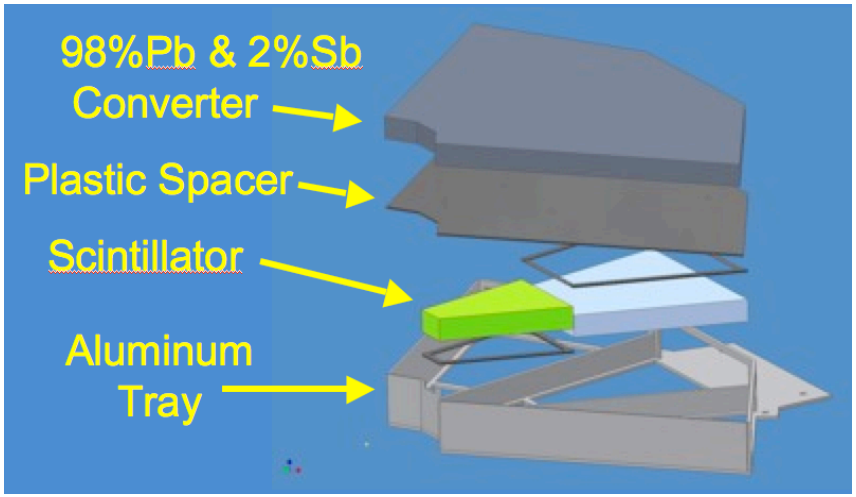
University of Maryland
PHENIX Collaboration Meeting
7/12/07

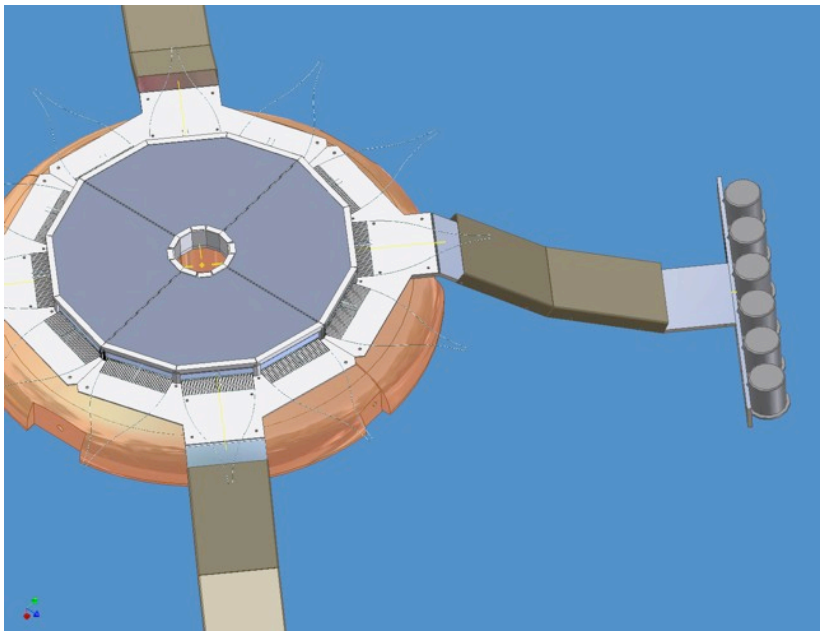
All plots provided by Shinlchi Esumi and his graduate students

Detector Components

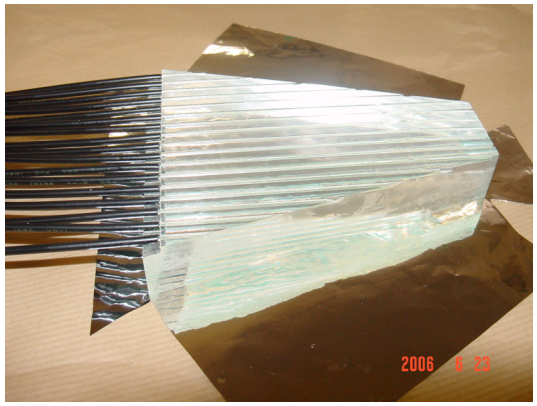


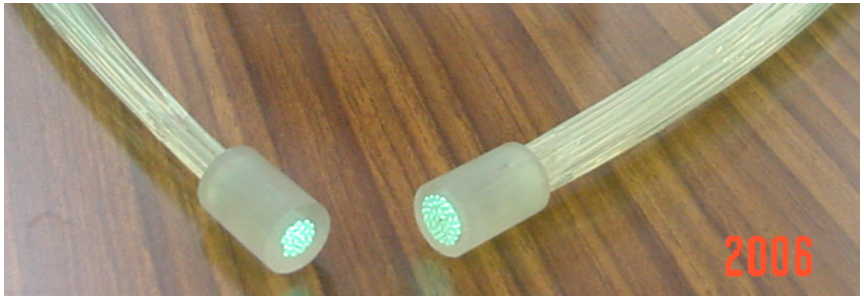
- Detector has North and South halves
- Each half divided into quadrants
- Each quadrant contains:
  - 1 Pb converter
  - 3 inner & 3 outer scintillators
  - 6 fine mesh PMT's (Hamamatsu R5543)

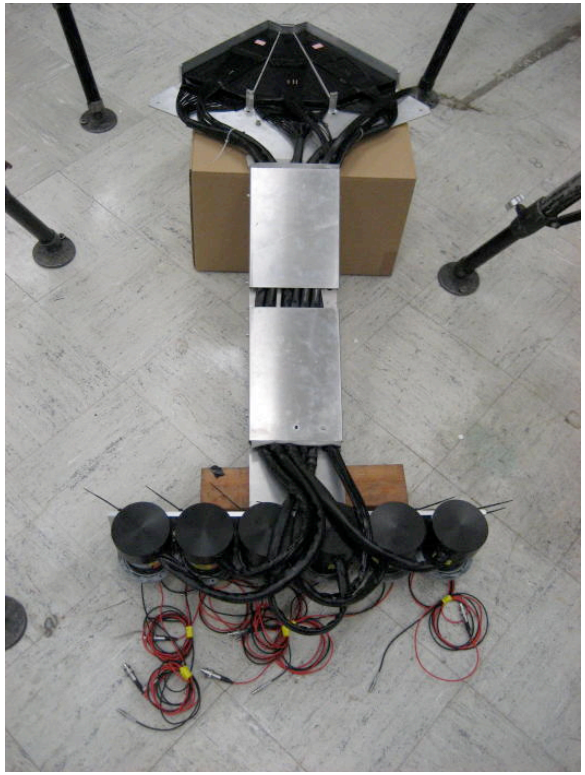


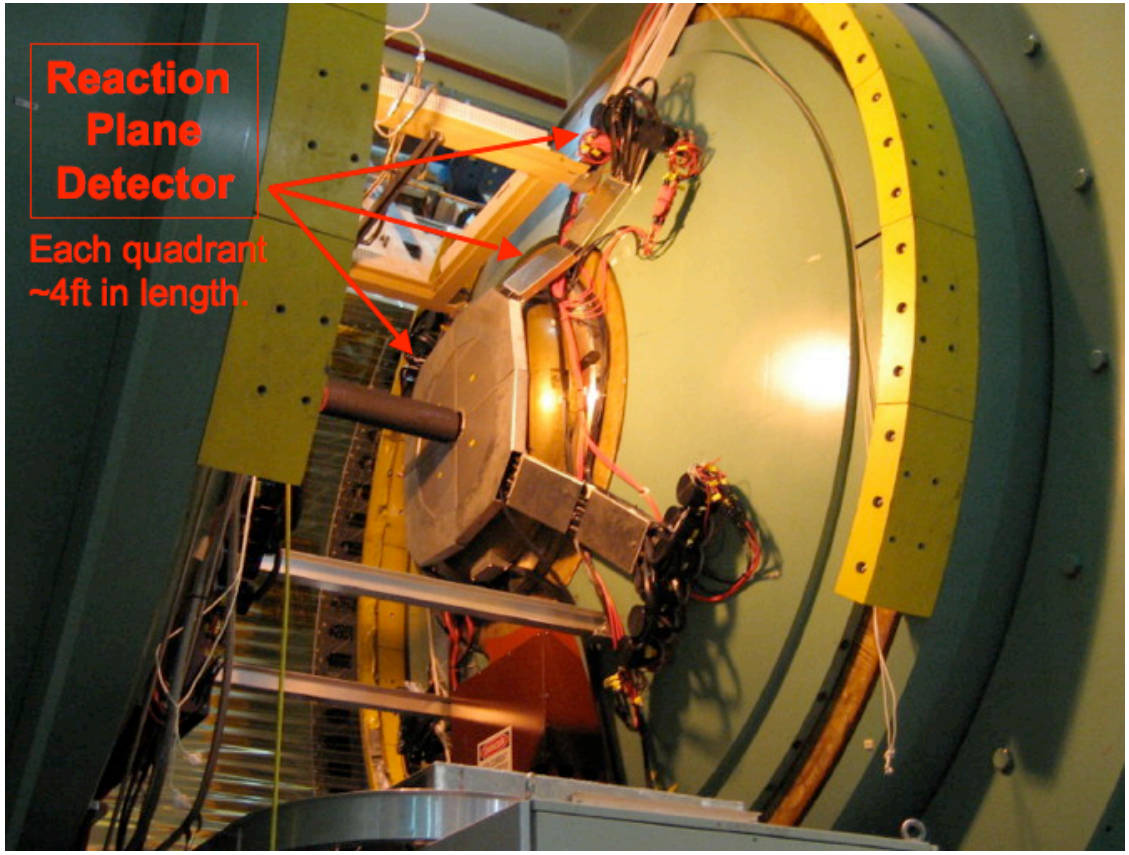


Detector Components









Historical Time Line

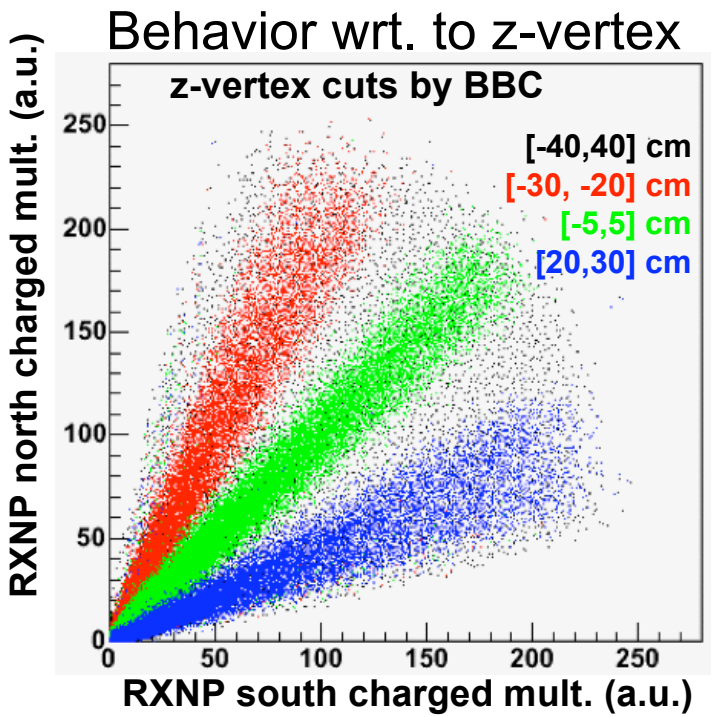
	Winter	Spring	Summer	Fall
2005			Conceived	Design & Simulations →
2006	→	→	Testing & Assembly, **Installed Aug.**	Electronics & Software →
2007	→	Finished Commissioning		

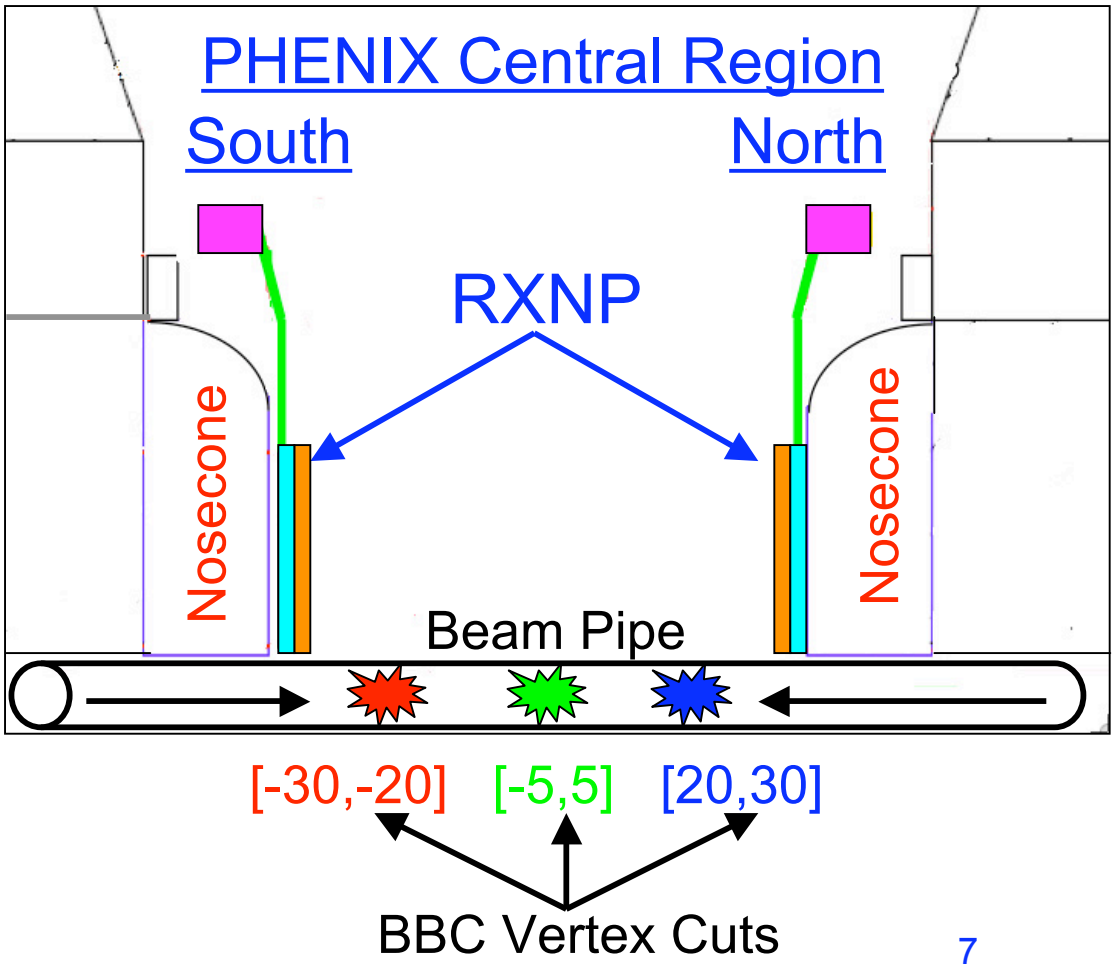
Only 20 months from conception to data taking

Detector Performance during Run 7

- 47 of 48 PMT's operational for entire run
- RXNP collected data on all Physics runs
- Efficiency of RXNP compared to BBC is 100% except for the most peripheral collisions [95%]

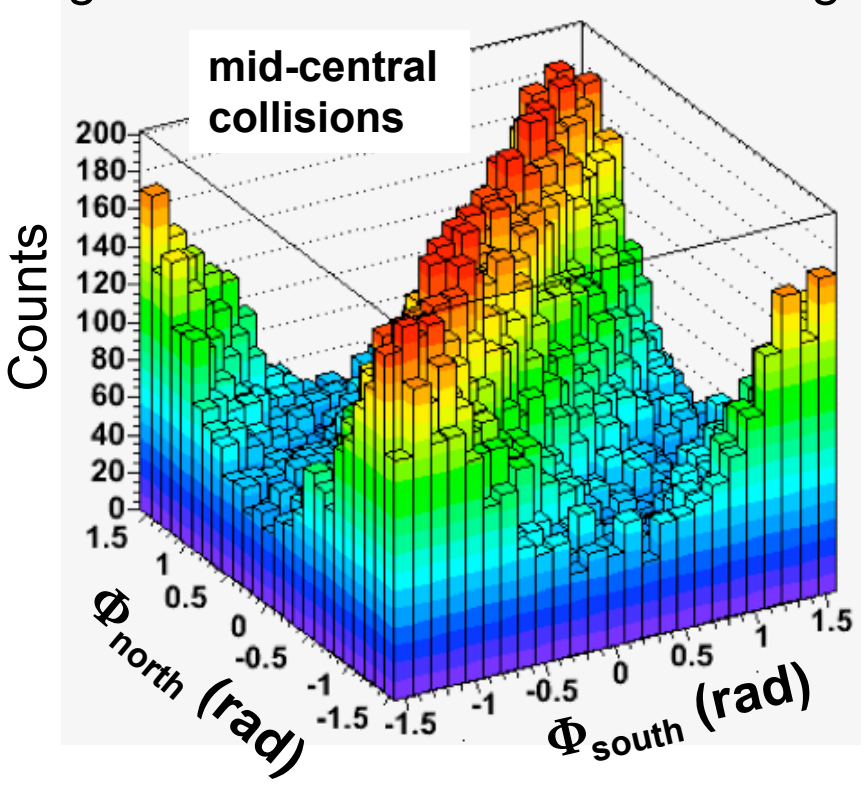
Detector Performance



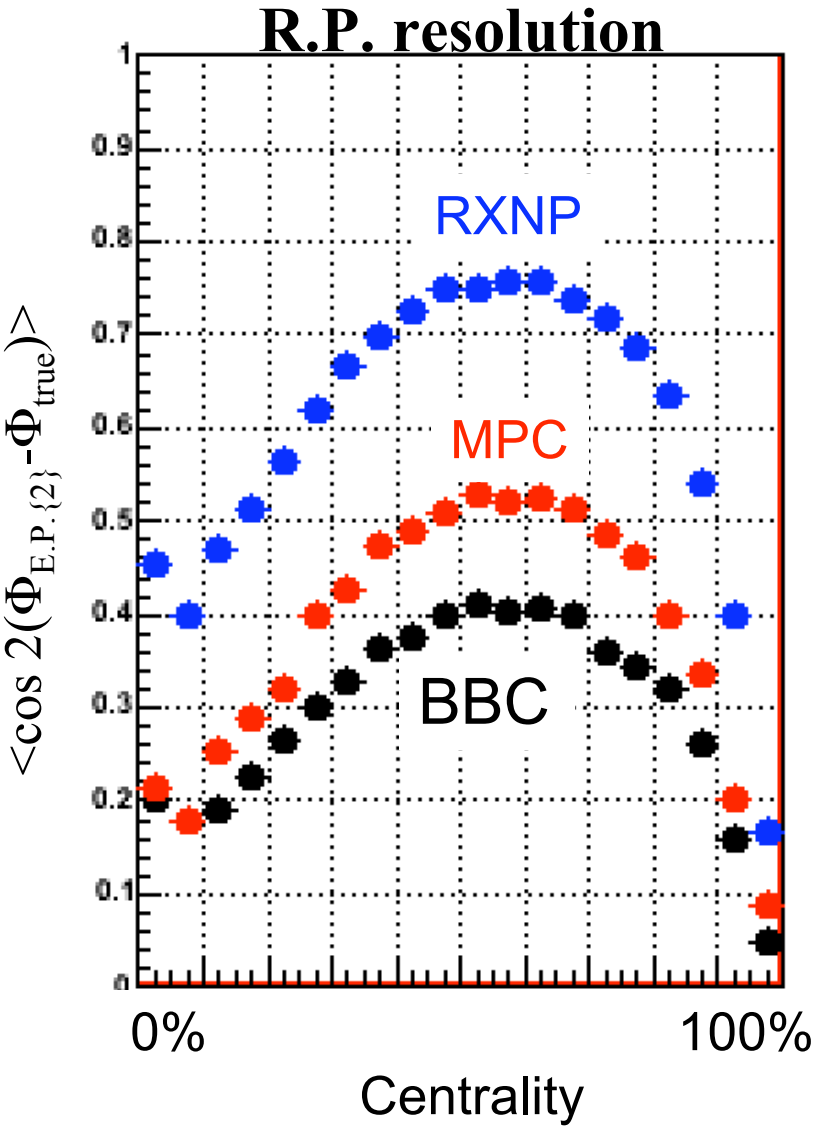


Detector Performance

Agreement of Determined RP Angle



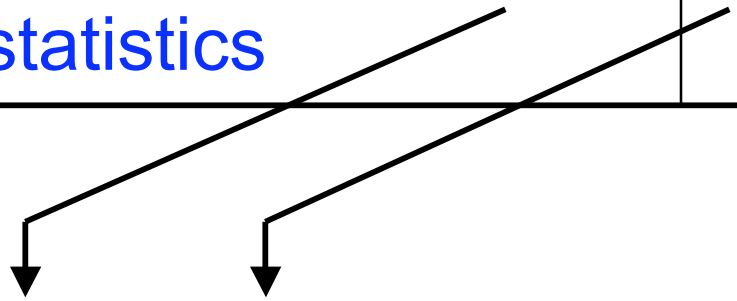
Detector Resolution



- Max Resolution
  - RXNP ~0.75
  - MPC ~0.52
  - BBC ~0.40
- RXNP resolution about a factor of 2 higher than BBC
- Combined resolution of BBC+MPC+RXNP is ~0.8

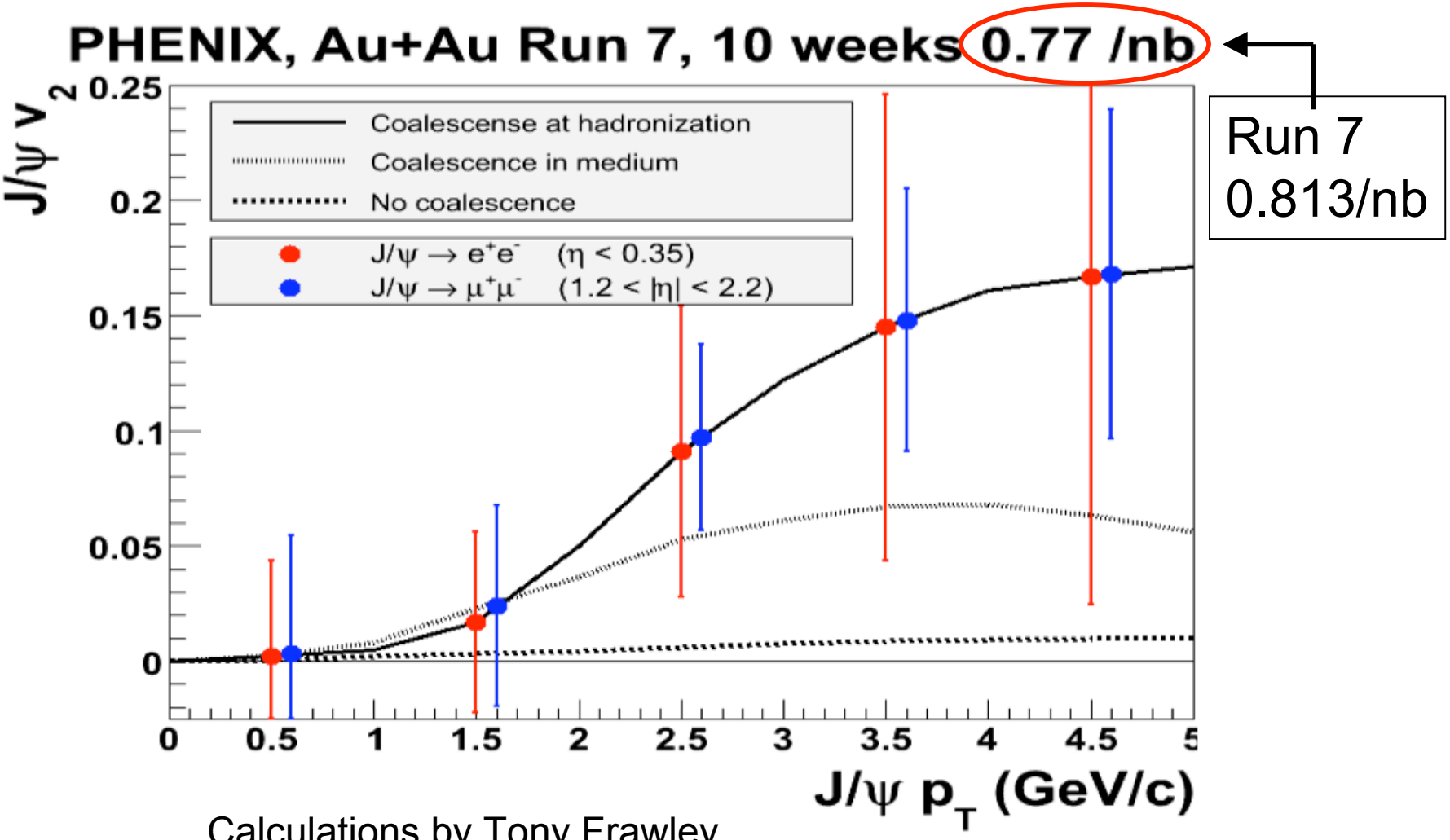
v_2 comparison of Run 7 to Run 4

Resolution	Statistics
Run 4 - 0.40 Run 7 - 0.75	Run 4 - 1.5B Run 7 - 5.1B
Equivalent to ≈3.5x statistics	3.4x actual statistics



3.5 x 3.4 ≈ 12x v_2 statistics of run 4

Possible J/ψ v_2

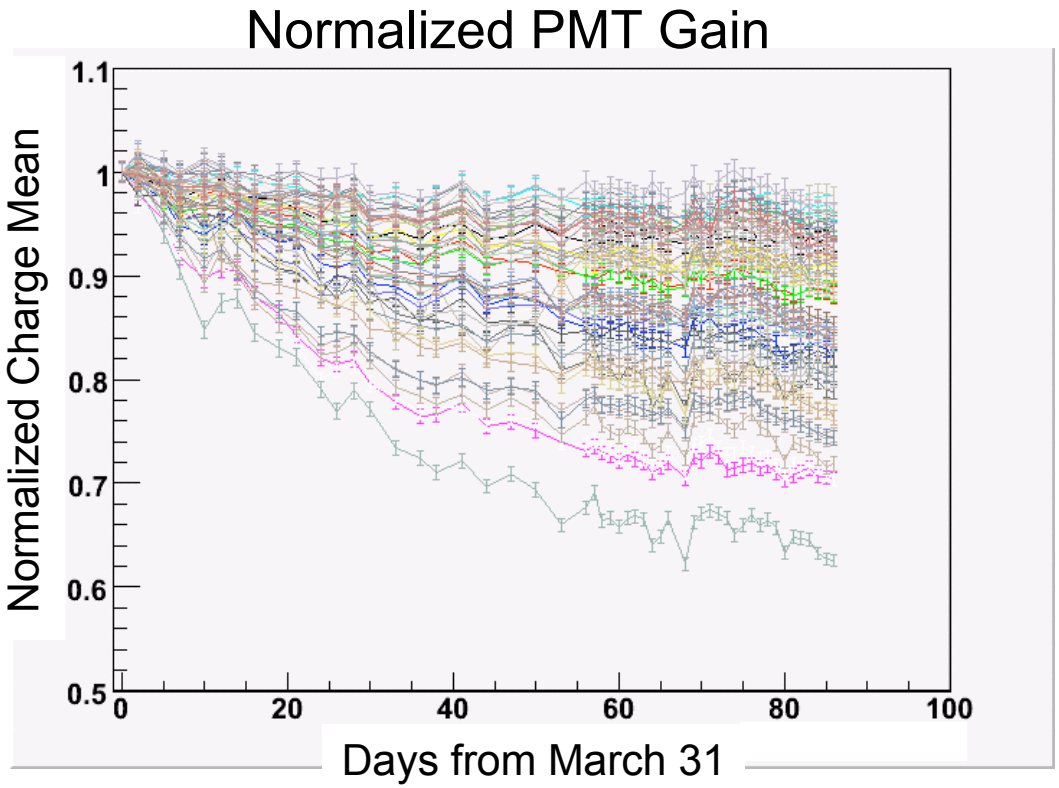


Run 7
0.813/nb

Calculations by Tony Frawley

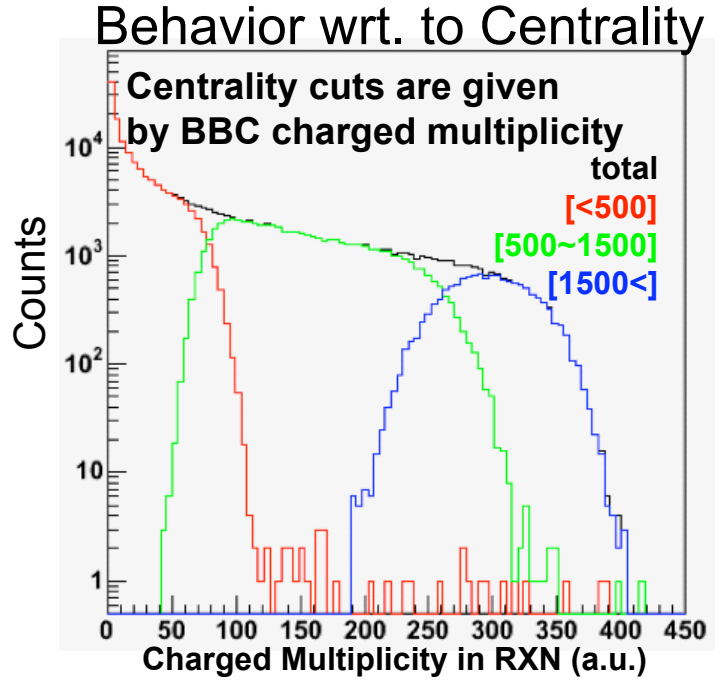
Detector Performance

- Saw some aging effects on PMT's



RXNP as a Trigger

- Wrt centrality RXNP behaves similarly to BBC
- Use for low energy Au+Au run
- Expected to increase trigger efficiency from ~15% with BBC to ~96%.
- During Run 7 timed in RXNPLL1 with respect to BBCLL1, but further testing needed to see if it will be a viable trigger for low energy Au+Au, d+Au, and p+p

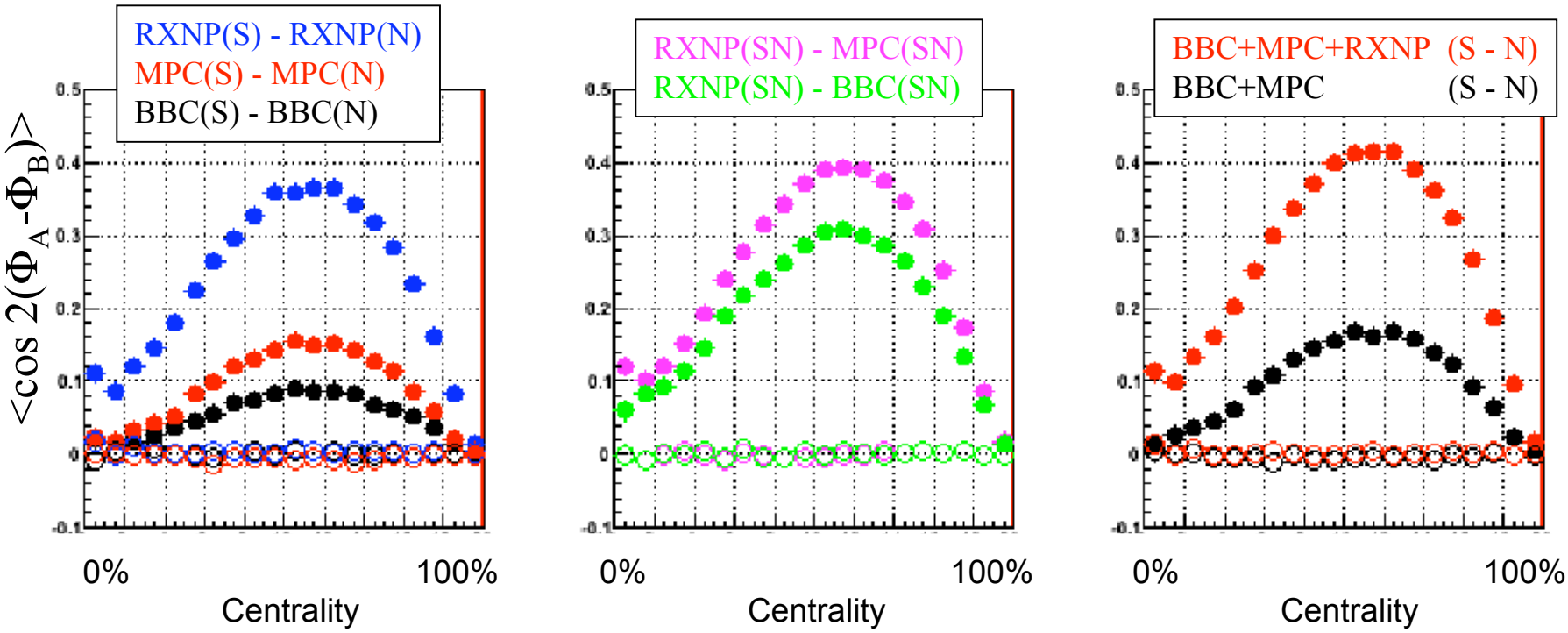


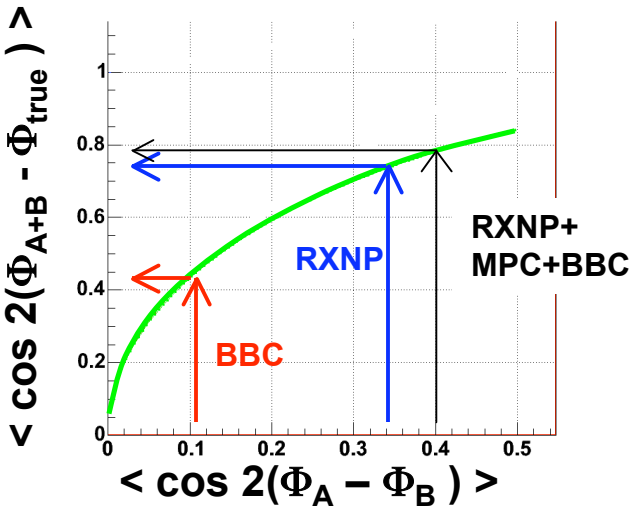
Summary

- RXNP successfully commissioned for Run 7
- Detector is working well
- Resolution of ~0.75 (BBC ~0.4)
- v_2 measurement in Run 7 equivalent to ~12x statistics of Run 4
- Further testing needed to ensure the success of RXNPLL1

Backup

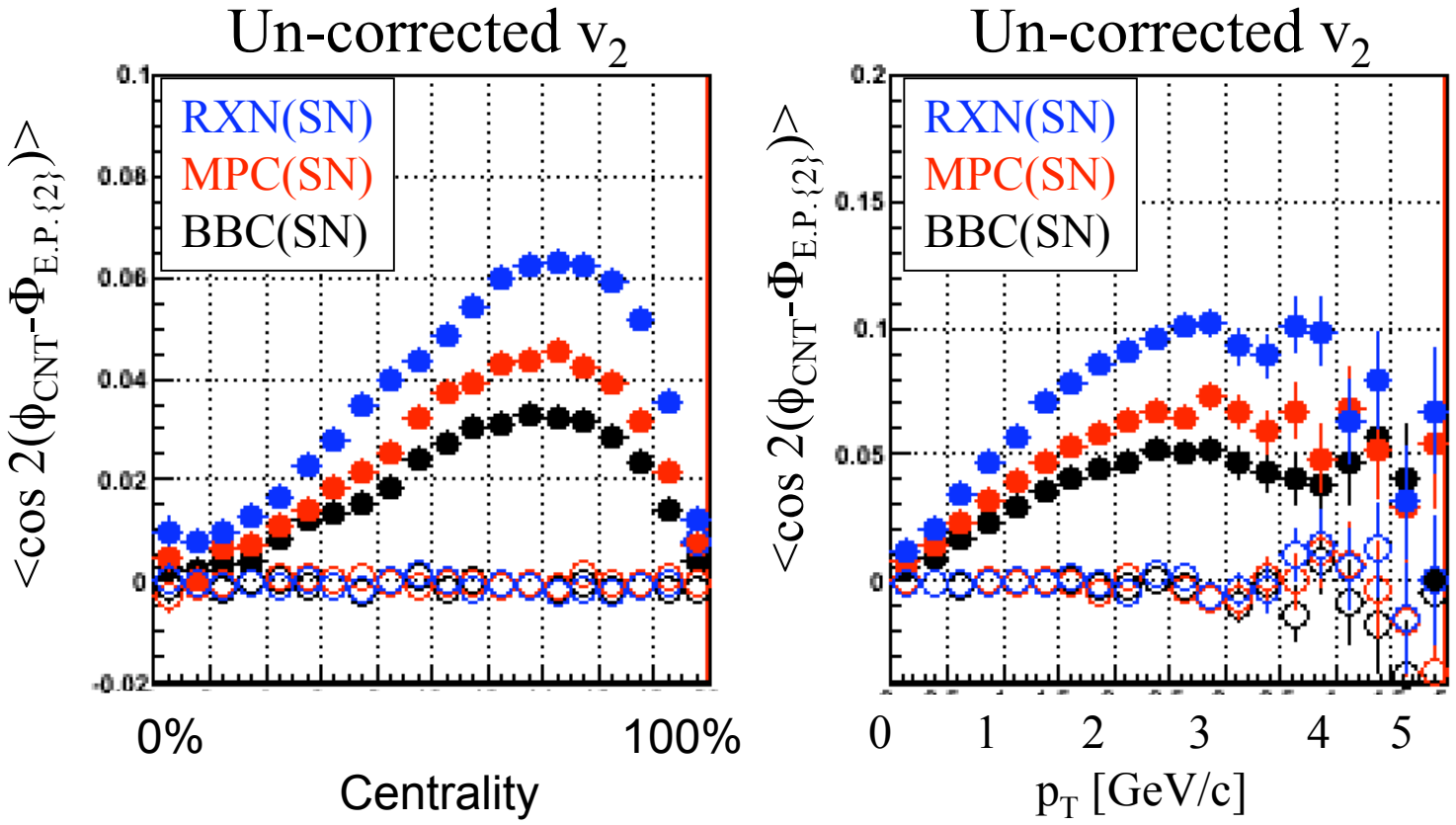
Combining Detectors



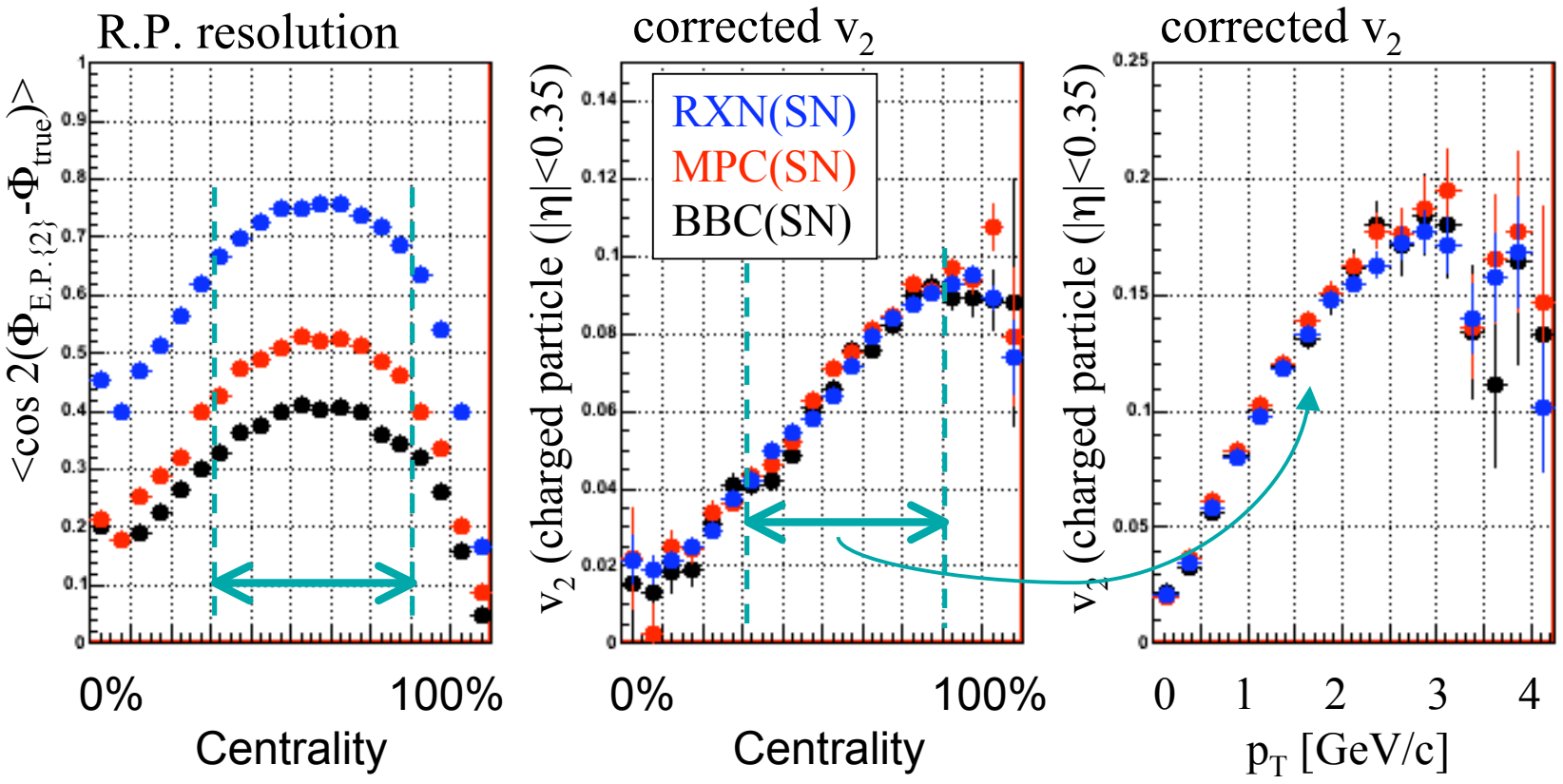


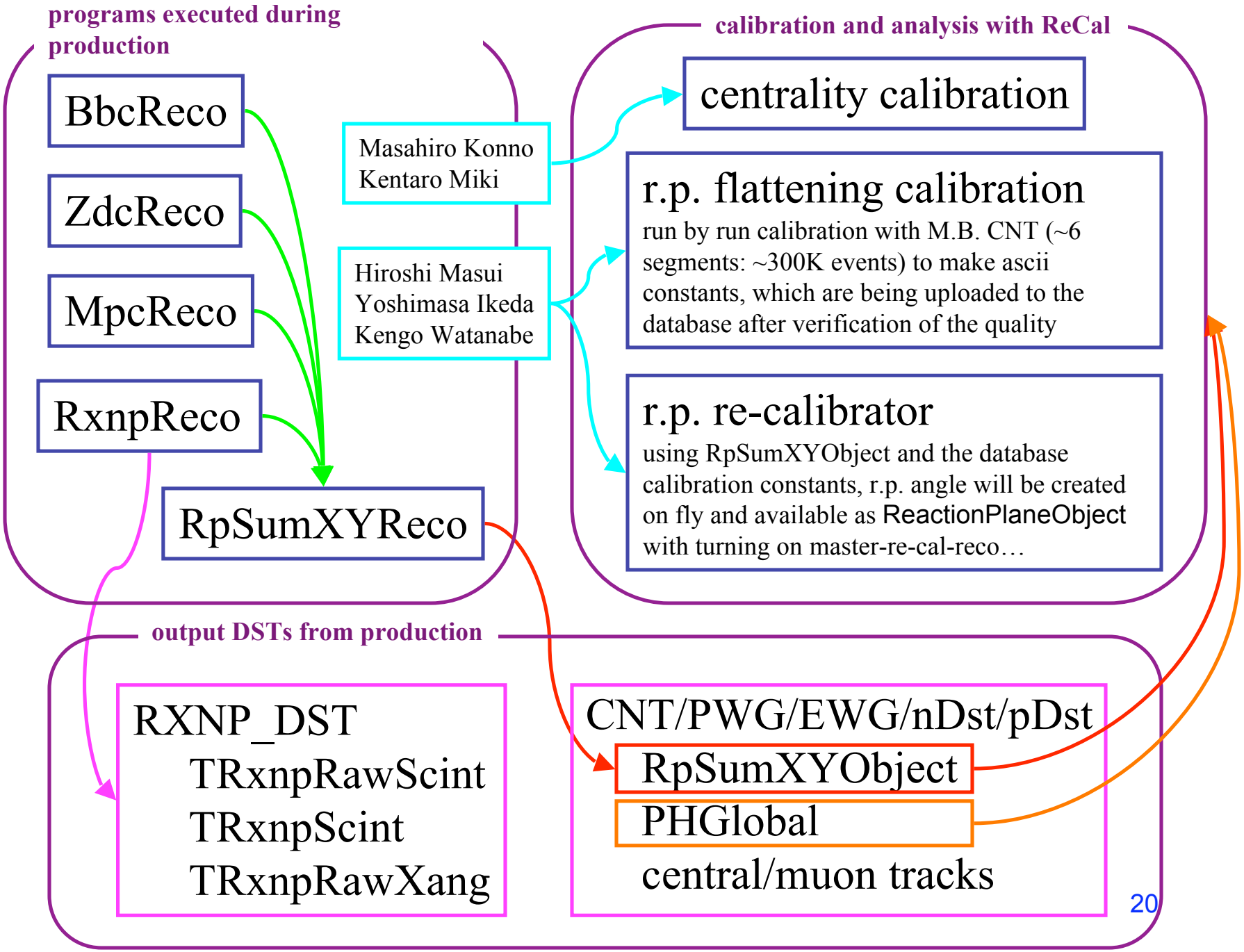
- Combining RXNP, MPC, and BBC yields an even higher resolution

Uncorrected v_2



Corrected v_2




programs executed during production
BbcReco
ZdcReco
MpcReco
RxnpReco
RpSumXYReco
Masahiro Konno
Kentaro Miki
Hiroshi Masui
Yoshimasa Ikeda
Kengo Watanabe
calibration and analysis with ReCal
centrality calibration
r.p. flattening calibration
run by run calibration with M.B. CNT (~6 segments: ~300K events) to make ascii constants, which are being uploaded to the database after verification of the quality
r.p. re-calibrator
using RpSumXYObject and the database calibration constants, r.p. angle will be created on fly and available as ReactionPlaneObject with turning on master-re-cal-reco…
output DSTs from production
RXNP_DST
TRxnpRawScint
TRxnpScint
TRxnpRawXang
CNT/PWG/EWG/nDst/pDst
RpSumXYObject
PHGlobal
central/muon tracks